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Relationships between User Experience and Intuitiveness of Visual and Physical Interactions

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Abstract

This paper investigates the effects of experience on the intuitiveness of physical and visual interactions performed by airport security screeners. Using portable eye tracking glasses, 40 security screeners were observed in the field as they performed search, examination and interface interactions during airport security x-ray screening. Data from semi structured interviews was used to further explore the nature of visual and physical interactions.

Results show there are positive relationships between experience and the intuitiveness of visual and physical interactions performed by security screeners. As experience is gained, security screeners are found to perform search, examination and interface interactions more intuitively. In addition to experience, results suggest that intuitiveness is affected by the nature and modality of activities performed. This inference was made based on the dominant processing styles associated with search and examination activities.

The paper concludes by discussing the implications that this research has for the design of visual and physical interfaces. We recommend designing interfaces that build on users' already established intuitive processes, and that reduce the cognitive load incurred during transitions between visual and physical interactions.

Intuition; Airport Security Screening; Eye Tracking; Intuitive Interaction; Intuitive Expertise

Intuition has been studied in a number of complex decision making domains (e.g. firefighting, nursing, and medical diagnosis) (see Klein, 1998). In these domains, people are required to process vast amounts of information and make decisions under pressure. With extensive experience and the development of domain specific knowledge, decision makers are able to perform tasks intuitively (Salas, Rosen, & DiazGranados, 2009). Access to an intuitive processing style facilitates rapid information processing and the efficient and effective performance of actions (Klein, 1998).

In the task of airport security screening (Figure 1), intuition has not been a focus of research. The majority of airport security screening research has investigated security screeners' visual knowledge of threat objects and their ability to detect threat objects in x-ray images of varying complexity. Experiments are typically performed under simulated conditions and performance is measured by hit rate percentage and reaction time (e.g. Michel, Koller, Ruh, & Schwaninger, 2006; Schwaninger, 2005). Only a small number of studies have sought to gain a more detailed understanding of the interactions performed by security screeners. For instance, Liu and colleagues found that compared to naïve people, security screeners had more efficient visual processes when processing images (Liu & Gale, 2011; Liu, Gale, & Song, 2007). Fixation maps showed that security screeners optimised their attention, ignoring some areas of the image and spending longer periods of time fixating on dark and dense areas. Naïve people on the other hand spread their attention over the entire image and scrutinised more items (Liu & Gale, 2011). While these studies provide insight into the nature of attention during visual search, they do not investigate the full range of interactions performed by security screeners. Because these studies compare naïve people with experienced security screeners, only limited inferences can be made about how skill develops as security screeners gain task experience.

Figure 1: The airport security screening context

The research in this paper was designed to investigate the role of intuition during visual and physical interactions performed by security screeners. This paper explores how experience facilitates intuitive information processing by security screeners. Greater understanding of the interactions performed by security screeners could contribute to the future design and development of the systems they use.

Intuition and Vision

Intuition is the pre-conscious processing of information that enables automatic and effortless decision making and performance of actions (Salas et al., 2009). The ability to perform tasks intuitively is attributed to the accumulation of knowledge gained through experience (Bastick, 2003). As experience is gained, task specific mechanisms are refined and previously effortful actions become automatic and effortless (Ericsson & Towne, 2010).

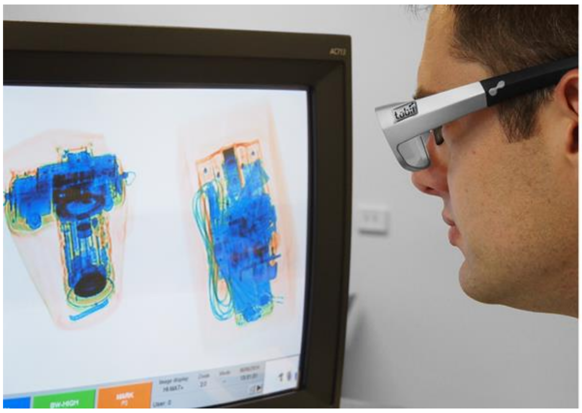
Intuition is considered to be particularly important and effective in complex environments. Hammond (1966, in Shanteau, 1992) suggested that intuition is induced in tasks where cues are unreliably measured, poorly organised and displayed simultaneously. In these situations, intuitive processes can overcome complexity as information is processed in parallel and attention is directed to task-relevant information. Analytic processes, on the other hand, operate by exhaustively processing information and are easily overwhelmed in complex situations (Salas et al., 2009).

In visual tasks, intuition appears to be situated in the early stages of vision. According to Wolfe's (1994) model of guided search, the visual system operates at a pre-attentive stage and an attentive stage. When presented with a scene the pre-attentive stage initially processes all elements in the visual field in parallel. However, the capacity of this process is only limited to extracting certain attributes such as size, colour and shape. The purpose of the pre-attentive process is to restrict the deployment of attentive processes which are only capable of processing one or a few spatial locations at a time. The attentive stage is performed as an extra step that binds the features of an object together for recognition (Wolfe, Võ, Evans, & Greene, 2011).

Pre-attentive processes are driven by salient features in the environment as well as the demands of the user. In search tasks with a well-defined target object and context, the motivations and goals of the observer can guide attentive processes to likely locations and filter out any irrelevant information. As situations become more complex and search tasks becomes less specific, however, it is thought that search processes rely more on attentive processes (Bravo & Farid, 2004). For instance, in security screening tasks, security screeners are required to search for multiple categories of threat objects in cluttered images. Bravo and Farid (2004) argue that parallel processes associated with pre-attentive search are less suited to these situations. They suggest that categorisation and recognition of items in cluttered scenes requires a serial visual process where each individual item is attended. However, intuition based on experience could facilitate efficient visual processes in the complex and uncertain task conditions faced by x-ray security screeners.

Method

Forty airport security screeners were observed while they performed airport security x-ray screening tasks. Observations were performed in the field under normal task conditions at the departures security checkpoint of an International Airport. Visual stimuli consisted of x-ray images of actual passengers' carry-on luggage. Participants were required to wear Tobii eye tracking glasses during observations (Figure 2, left). Tobii eye tracking glasses collected video, eye movement and audio data. Video data was recorded from the security screeners' point of view. Eye movement data, in the form of fixations and saccades, is presented as an overlay on the video (Figure 2, right). This data enabled inferences to be made about the processing styles engaged by security screeners as vision is closely linked to cognition (Hayhoe & Ballard, 2005). Participants were required to perform security screening tasks without the aid of spectacles to ensure there was no interference with the eye tracking glasses. Participants delivered concurrent verbal protocol during observations, verbalising their decision making processes and describing their actions. This verbal data was used to clarify aspects of security screeners' cognitive processes. Each observation lasted 20-30 minutes in total. Semi-structured interviews were conducted with each participant following observations. Interviews aimed to clarify aspects of decision making and information processing.



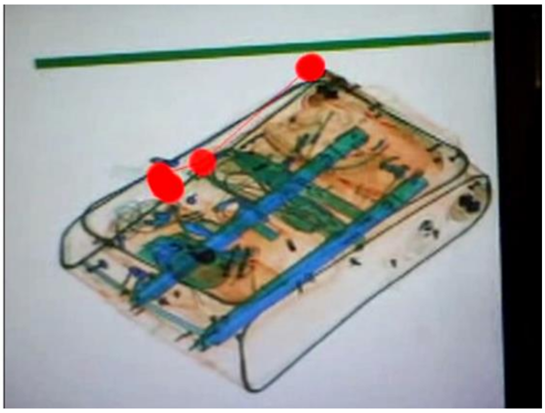


Figure 2: Tobii eye tracking glasses worn during the observations (left), Video and eye movement data collected during observations (right)

For the purpose of investigating the relationship between experience and the intuitiveness of visual and physical interactions, security screeners were recruited to represent a broad range of experience. On the job experience of recruited security screeners ranged from 1 to 108 months.

Analysis

The video, eye movement and verbal data collected from Tobii eye tracking glasses was coded using Noldus The Observer XT v10.5 (Noldus, 2013). A coding scheme was developed based on the visual and physical interactions performed by security screeners during x-ray screening.

Activity Codes

Activity codes specify the activities that security screeners performed and record the length of time that they were performed. For the research presented in this paper, analysis focused on three activities:

i. Search

Visual interactions with x-ray image stimuli displayed on the screen for the purpose of finding threat objects or areas of concern. Search activity was characterised by visual scanning and attention that was distributed to a number of areas within the visual stimuli.

ii. Examination

Visual interactions with stimuli displayed on the screen for the purpose of inspecting areas of interest or identifying objects. Examinations were typically characterised by attention that was focused on a specific object or area within the visual stimuli.

iii. Interface interaction

Physical interactions with any function on the user interface. Interface interactions were performed by physically interacting with the touch screen input device in order to select various image enhancement functions (IEFs) presented on the screen (Figure 3).

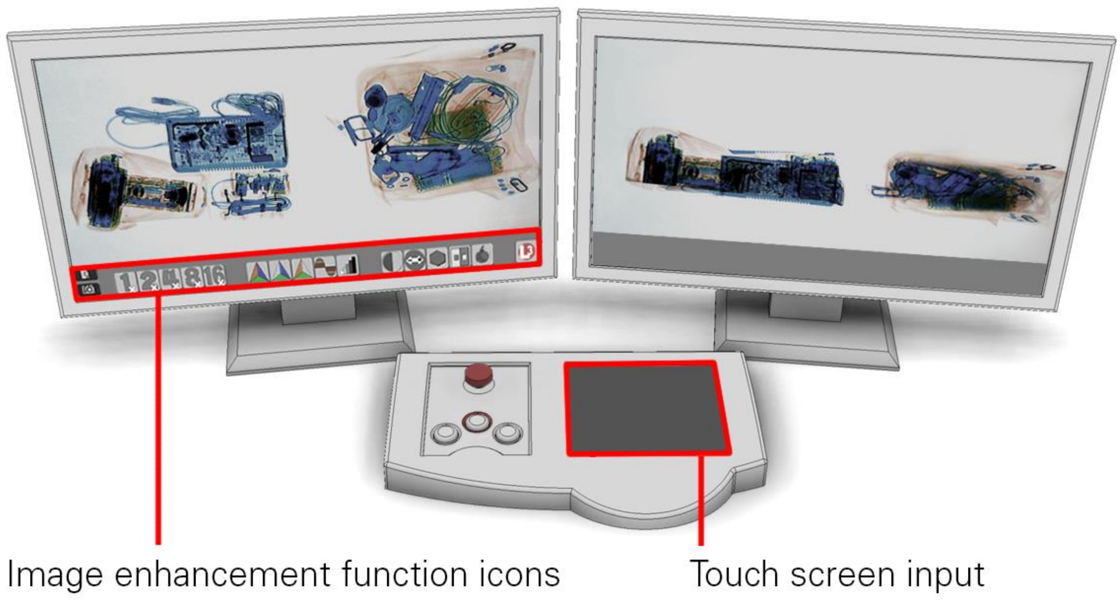


Figure 3: Equipment set-up used by security screeners showing image enhancement function icons and touch screen input

A variety of IEFs are available which allow the security screener to zoom in on images, change the way colours are displayed and alter the contrast and luminance of the images. IEFs are used to assist visual processes under difficult image conditions and identification of specific object categories (e.g. cluttered images or dense metallic objects).

Intuitiveness Sub-Codes

Sub-codes were applied to coded activities to indicate the intuitiveness of actions performed by security screeners. Heuristics for the application of sub-codes were developed using characteristics of intuition and eye tracking metrics discussed in the literature. For instance, short fixations are associated with efficient information processing, whereas longer fixations are associated with deeper processing and effortful analysis of information (Poole & Ball, 2006).

Analysing the sequences and arrangements of fixations and saccades can further identify the nature of cognitive processes. For example, eye movement behavior that involves many back and forward movements is generally indicative of inefficient and exhaustive search. In contrast, eye movement with a unidirectional path indicates efficient search (Goldberg & Kotval, 1999). Intuitiveness sub-codes and application heuristics are shown in Table 1. To further ensure the consistent application of sub-codes, concurrent verbal protocols were used to clarify the cognitive processes behind actions.

Table 1: Sub-codes and heuristics for coding scheme

Sub-Codes	Description	Example Heuristics
Intuitive	Pre-conscious and parallel processing of stimuli enabled by prior knowledge, familiarity and pattern matching. Fast, effortless and accurate decision making and performance of actions (Bastick, 1982, 2003; Salas et al., 2009).	- High saccade to fixation ratio (Goldberg & Kotval, 1999) - Non-verbal process (Bastick, 1982, 2003; Blackler, Popovic, & Mahar, 2010) - Guidance of attention to task relevant features (J. M. Wolfe, 1994; Jeremy M. Wolfe, 2010) - Efficient scanpath with selective attention (Goldberg & Kotval, 1999; Mruczek & Sheinberg, 2005; Poole & Ball, 2006)
Partially Intuitive	Automation of low level processes interchanged with deliberative control over higher level processes (Shanteau, 1992). Some automation, but higher level processes requiring attentive control (Baylor, 2001).	- Limited verbalisations (Bastick, 1982, 2003) - Variable scanpath, some regressive saccades (Poole & Ball, 2006) - Mixed fixation to saccade ratio (Goldberg & Kotval, 1999) - Switching between intuitive and non-intuitive processing styles (Baylor, 2001)
Non-Intuitive	Analytic and rational decision making. Effortful information processing and calculated analysis of actions (Bastick, 1982; Baylor, 2001).	- Verbalised decision making process (Bastick, 1982, 2003) - Dwell fixations (Goldberg & Kotval, 1999; Poole & Ball, 2006) - Regressive saccades (Poole & Ball, 2006) - Focused fixation spatial density (Goldberg & Kotval, 1999)

Results

A correlation analysis and multivariate analysis of variance (MANOVA) were performed to analyse the relationship between security screener experience and intuitiveness of visual and physical interactions performed during screening tasks. Slope estimates, R-square and P-values between security screener experience and intuitiveness of search, examination and interface interaction are reported. Mean percentages of intuitive and non-intuitive activity are reported.

Scatterplots in Figure 4 show the relationship between security screener experience and the intuitiveness of search. Search was predominantly performed intuitively for all security screeners (mean=48.28%). A significant positive relationship between experience and intuitive search was observed (slope=0.31; R^2=0.23; P=0.002). Only a small percentage of search was performed non-intuitively (mean=9.83%). A strong but not significant negative relationship was observed between security screener experience and non-intuitive search (slope=-0.11; R^2=0.09; P=0.05). The percentage of non-intuitive search was always lower than intuitive search, on average for all participants.

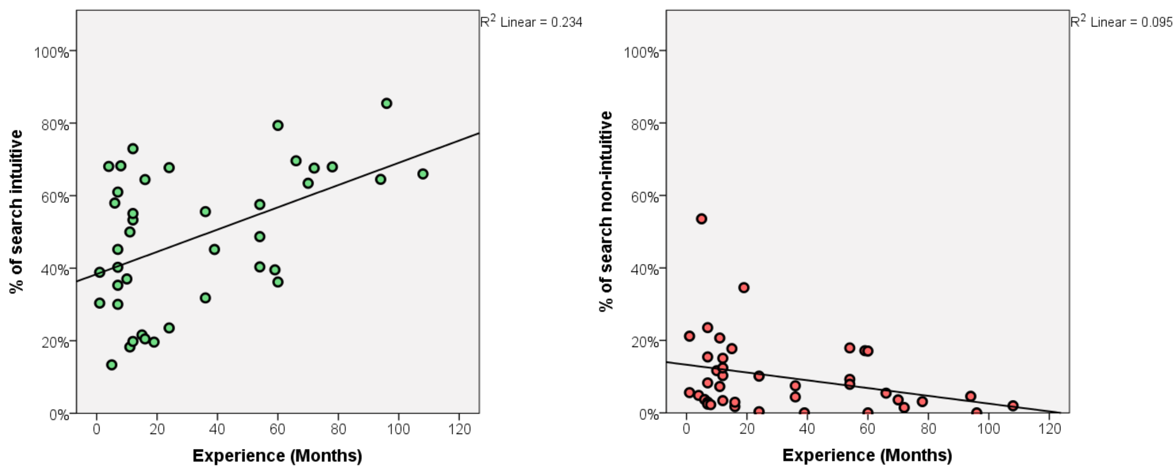


Figure 4: Relationship between experience and intuitive search (left), relationship between experience and non-intuitive search (right)

The relationship between security screener experience and the intuitiveness of examinations is shown in Figure 5. Examinations were predominantly performed non-intuitively for all participants (mean=64.83%). In comparison, a small percentage of examinations were performed intuitively (mean=5.52%). A significant positive relationship was found between experience and intuitive examination (slope=0.09; R^2=0.14; P=0.016). A significant negative relationship was observed between experience and non-intuitive examination (slope=-0.21; R^2=0.12; P=0.029). Despite a significant increase in intuitive examinations in relation to experience, the percentage of intuitive examinations always remained much lower than non-intuitive examinations, for all participants.

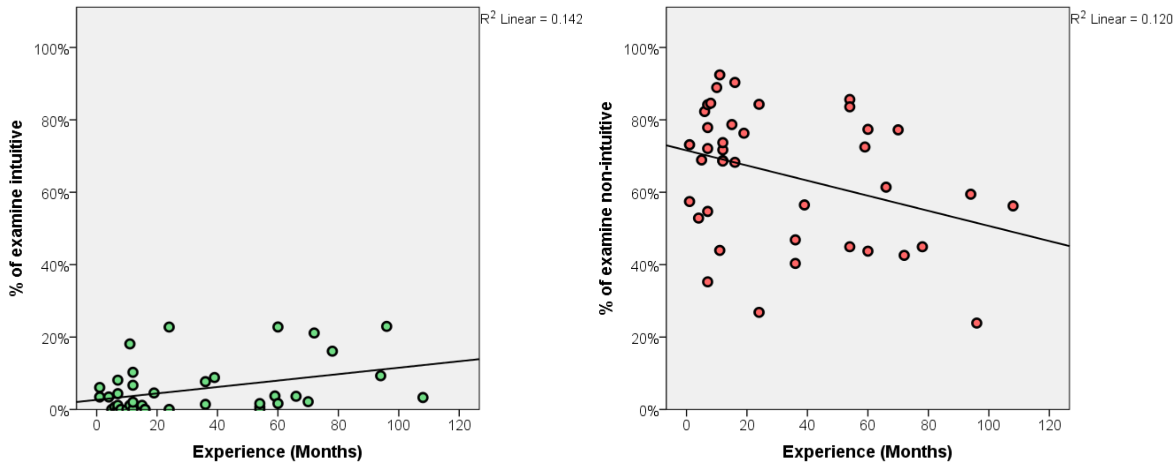


Figure 5: Relationship between experience and intuitive examination (left), relationship between experience and non-intuitive examination (right)

The relationship between security screener experience and the intuitiveness of interface interactions is shown in Figure 6. For all participants, a small percentage of interface interactions were performed intuitively (mean=19.97%). The majority of interface interactions were performed non-intuitively for all participants (mean=51.56%). A strong positive relationship was observed between experience and intuitive interface interactions (slope=0.25; R^2=0.18; P=0.007). A strong negative relationship was observed between experience and non-intuitive interface interactions (slope=-0.33; R^2=0.18; P=0.006). As the experience of security screeners increases, the percentage of intuitive interface interactions increases and the percentage of non-intuitive interface interactions decreases. The effect of experience is such that at high levels of experience (>87 months) the performance of intuitive interface interactions exceeds, or is at least on par with non-intuitive interface interactions (Figure 6).

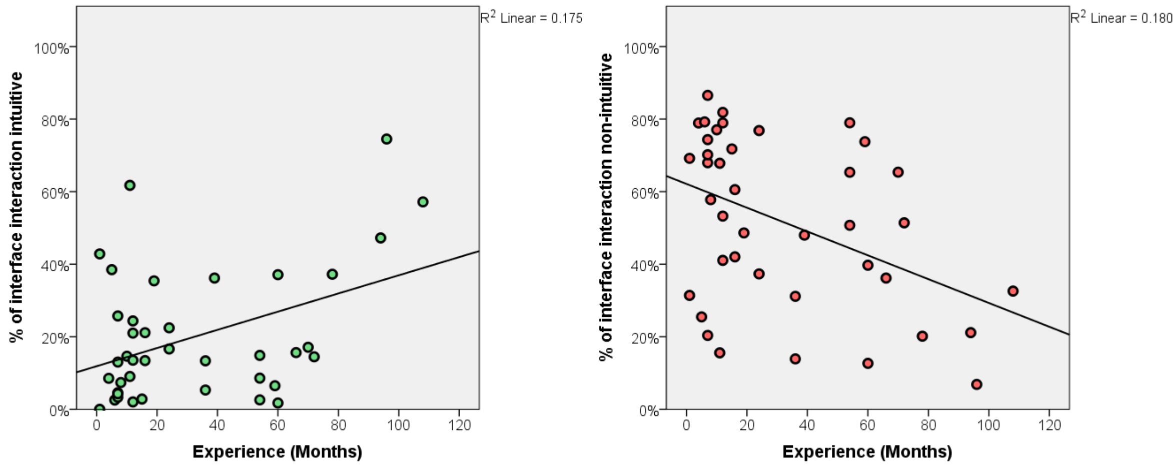


Figure 6: Relationship between experience and intuitive interface interaction (left), relationship between experience and non-intuitive interface interaction (right)

These results show that there is a strong relationship between security screener experience and the intuitive performance of visual and physical interactions during screening tasks. As more experience is gained, search, examinations and interface interactions are performed more intuitively. In order to elaborate on the nature of these interactions, textual data gained from transcriptions of participants' interview responses was used.

Consistent with the results from eye tracking data, more experienced security screeners described efficient and effortless search processes characterised by immediate comprehension of visual stimuli. These effortless search processes were reported as an ability to recognise typicality; "*it comes through and it's a typical looking object and you have a slight feeling and you know what it is usually you, you trust your instincts and you just, you just clear or pass it" (36 months experience).*

Both experienced and inexperienced security screeners reported the effect of guided search. Guided search is the process in which attention is captured by salient features within visual stimuli. With knowledge of the task, this can help guide attention to task relevant information: "*So usually if you are seeing black or the darkest of blue instantly your eyes will go straight to that to look at it a bit further" (7 months experience).*

Although inexperienced security screeners described guided search, they were more likely to describe sequential search processes with explicit goals. These goals often related to specific categories of threat objects: *"First you search for anything that might be… so you check for anything that might look like its sharp. Anything that might look like it's dangerous. You check for any LAGs, if there might be oversized or a huge amount and if there is nothing else then you let it go" (12 months experience).*

Two types of examinations were described by experienced and inexperienced security screeners; examinations that were effortless and examinations that were effortful. Descriptions of effortless examinations were associated with the immediate recognition of objects and absence of deliberative process: "*some of them appear automatic on screen. Like if it's a knife it'll appear straight away, you recognise it. Sometimes it's a toy gun, a real gun, it appears straight away" (54 months experience).*

Descriptions of effortful examinations were strongly linked to problem solving and the use of interface interactions. Cluttered and opaque items were identified as the main focus of effortful examinations by all security screeners. The use of interface functions was primarily associated with these image types as well. Experienced security screeners often described their use of interface functions with examinations in terms of cause and effect, focusing on how they are used to support the separation and recognition of objects: "*I turn to black and white and then I usually just fade across the touch screen in and out and by doing that it gives a little bit of perspective so you can see what is solid and what isn't solid more so and as you are fading you see that, that little bit there is solid so then you might go in on a times two [zoom]" (96 months experience).*

In contrast, less experienced security screeners were more inclined to describe step by step interface interaction procedures to support examinations. These were often expressed as simple rule based statements; "*if it's pretty full with stuff…then you usually go times two (zoom). Then if I still can't figure it out I go black and white" (7 months experience).*

Discussion

Results from this research show that experience has a significant positive effect on the intuitiveness of search, examination and interface interactions performed by security screeners. For both examination and interface interactions, experience had a strong negative effect on non-intuitive interactions. These findings are consistent with intuition literature (e.g. Bastick, 1982; Blackler et al., 2010; Sinclair & Ashkanasy, 2005; Stanovich & West, 2000) and literature investigating perceptual expertise (e.g. Bravo & Farid, 2012; Myles-Worsley, Johnston, & Simons, 1988; J. M. Wolfe et al., 2011). It is generally accepted that experience is strongly related to the effective and efficient use of interactive devices and the performance of visual search tasks. In addition to the effects of experience, results show that the nature and modality of the activities performed have a substantial influence on the intuitiveness of interactions performed. This effect is clearly demonstrated by the contrasting influence of intuitive visual interactions performed during search and examination activity. The different modes of visual interactions investigated in this research correspond strongly to the stages of pre-attentive and attentive vision that were described earlier in this paper.

The influence of pre-attentive visual processes is inferred by the high percentage of intuitive search performed by all participants. Consistent with the context in which airport security screeners' search is performed, pre-attentive processes are induced in complex tasks which require simultaneous processing of multiple stimulus inputs (Roda, 2011). Pre-attentive processes are considered as innate processes, or processes that develop early in humans (Roda, 2011). These characteristics of visual processing can account for the high base percentage of intuitive search, even for quite inexperienced security screeners.

Although pre-attentive search processes are considered innate, our results also suggest that significant improvements can be made to search process as a result of experience. Textual data from interviews indicate that improvements are to some extent facilitated by the refinement of search templates as a result of experience. It has been shown that inexperienced security screeners search templates are comprised of specific target objects (e.g. guns, knives) as well as general concepts (e.g. dark, clutter). In comparison, expert security screeners' search templates are based predominantly on general concepts and also demonstrate an understanding of situational typicality. The use of generalised search templates provides greater tolerance to the variations that can occur in an object's appearance and in the search scene. This can help mitigate the effects of clutter and improve responsiveness to the demands of the task (Bravo & Farid, 2009, 2012). The ability to effectively judge typicality is a trait of expertise, which facilitates identification of invariant patterns and discrimination of complex information (Norman, et al. in Klein & Hoffman, 1992, pp. 89-90). For experienced security screeners, this helps them rapidly comprehend and evaluate visual stimuli.

Examinations performed by security screeners are consistent with the attentive stage of vision due to their mostly non-intuitive performance by all security screeners. Effortful examinations were frequently described in relation to interface interactions as an approach to problem solving. In our previous analysis of the same data (Swann, Popovic, Blackler, & Kraal, 2014), examinations and interface interactions were shown to be performed in sequences to assist problem solving. These problem solving sequences often involved several transitions between each activity. This type of switching between tasks is a common interaction in human computer interaction. Interleaved actions facilitate in-situ planning and reduce cognitive load by offloading some of the processing requirements to the environment rather than holding them in working memory (Payne, Howes, & Reader, 2001). As well as reducing cognitive load, it is common for interleaved actions to cause interference and result in slow performance of each respective activity. Slowdown is attributed to the difficulty of maintaining and switching between more than one task goal (Roda, 2011). The interactive nature of examinations and interface interactions could account for the overall trend for security screeners to perform interface interactions non-intuitively.

Like search and examination activity, results show that significant increases in the intuitiveness of interface interactions are achieved in relation to experience. Textual data from interviews suggest that experienced security screeners' examinations and interface interactions are closely integrated. Experienced security screeners' descriptions of interface interactions are often characterised by an understanding of the image state as well as how the intended actions would alter the image state in order to achieve a specific goal. The ability to see relationships between actions and context facilitates the identification of shared task cues which helps mitigate the interference experienced during task switching (Altmann & Trafton, 2002). In comparison, effortful examinations and interface interactions were described by non-experts as rule based expressions, evident of clear task switching.

Design Implications

This research has contributed new knowledge about the processes underlying the physical and visual interactions performed during airport security x-ray screening tasks. Application of this new knowledge can assist the design of systems and interfaces that are responsive to the requirements of both experienced and inexperienced security screeners. By understanding how experience contributes to the interactions performed by security screeners, systems and interfaces can be designed to support processes that lead to more intuitive interactions.

This research has identified that search activity is frequently performed intuitively by both experienced and inexperienced security screeners. This, at least in part, is attributed to the innate development of pre-attentive visual processes. In order to foster this efficient visual process it is important to minimise any unnecessary interruptions caused by visual clutter presented on the interface during search activity. This is a particularly important consideration for the future design and integration of automated features that are considered an integral part of the development of screening systems (Wetter, 2013). Pre-attentive processes are captured by basic salient features such as colour and movement. Care should be taken when designing alerts, notifications and features so that they do not take away from critical visual processes (Roda, 2011). A potential way to address this while still facilitating automation is through the design of attention aware systems. Attention aware systems support human attention and adapt their state based on the attentional state of the user (Picard, 1998 in Bowman, Su, Wyble, & Barnard, 2011, p. 115). By detecting the gaze patterns of a user, an attention aware interface could identify when a user needs help. The user could be provided with task relevant cues when they are experiencing difficulty, for example during lengthy fixations. During efficient visual interactions the system would reserve any interruptions for times of critical importance.

Improving the efficiency of examinations and interface interactions could be addressed by reducing the cognitive cost of interactions and reducing the effect of task switching. Gray and Boehm-Davis (2000 in Payne et al., 2001) stated that the nature of a user's behaviour can be adjusted by even small changes to the cost structure of an interface. An effective method to achieve this is the design of naturally mapped interfaces. Natural mapping provides design cues and functions that reduce the distance between user's goals and how they are communicated to the system (Djajadiningrat, Overbeeke, & Wensveen, 2002; Norman, 1988). Positive examples of this are already present in current interfaces used for security screening. For instance, on the x-ray screening equipment used in this research the 'fade' image enhancement function facilitates direct control of image contrast. By sliding their hand over the touch screen input, a user can make gradual changes to the contrast of an image. The user receives immediate feedback during this interaction which allows the user to make small changes to interactions in response to outcome. This action creates a strong link between intention – to see through layers of the image – and the direct action of manipulating the contrast of the image.

Unlike this function, a number of other interface functions are based on arbitrary image states, for example black and white, pseudo colour and high contrast. Interface directness could be achieved by designing functions that match common goals in the security screening activity rather than arbitrary visual concepts. This is consistent with recommendations based on the work of Altmann and Trafton (2002), who suggest that during critical periods of task switching environmental cues must correspond to task goals.

While the focus of this research has been the security screening task, the findings and implications of this research can be applied more generally to complex tasks and tasks requiring the use of assistive devices. In general work domains, supporting visual attention could assist the productivity of individuals and assist efficient multitasking. This area is particularly compelling due to the proliferation of personal technology and an increasingly connected work life. Other areas of interest may be virtual learning and training environments for attention critical tasks. As well as evaluating training progress, the design of interfaces that encourage effective attentional processes could result in more competent learners. The outcomes of this research have implications for the design of interfaces used in critical environments such as driving, aviation and air traffic control. In these environments individuals have to balance several competing goals while engaging various physical interactions and monitoring a diversity of visual inputs. Supporting effective visual attention in such domains is of critical importance.

Conclusion

This research has shown that there is a strong relationship between experience and intuitiveness of search, examination and interface interactions performed by security screeners. In addition to experience, this research has identified that intuitiveness of screening activities is also influenced by other factors. Other factors focused on are the adaptability of attentive and pre-attentive processes to visual tasks and the effect of task switching on the performance of attentive problem solving.

Despite the effects of these other factors, the significant relationship between experience and intuition suggests that underlying processes are continuously improved as more experience is gained. Interview responses indicate that improvements are due to the refinement of search templates, the integration of goals and actions, and an understanding of cause and effect.

The significance of this research applies to both the airport security screening task as well as more generally to complex decision making environments. New knowledge emerging from this research can aid the design of systems and interfaces that are more responsive to the demands of security screeners and the performance of security screening tasks. Findings from this research can be applied more broadly to interactive devices used in common tasks as well as complex tasks where effective visual attention is of great importance.

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Levi Swann received his Bachelor of Design (Honours), majoring in Industrial design in 2009 from Queensland University of Technology. Prior to commencing his PhD, Levi has been involved with consumer product design and graphic design projects locally and overseas. His PhD research investigates the processes and knowledge utilised by airport security screeners during the task of x-ray threat detection, with the aim to understand and model the role of intuitive expertise in this context (levi.swann@qut.edu.au).

Vesna Popovic

Vesna Popovic (PhD) is a Professor in Industrial Design at Queensland University of Technology, Brisbane, Australia. Her research focus is within experience and expertise, intuitive interaction and intuitive navigation domains. She has made an international contribution to design research where she has integrated knowledge from other related areas and applied to the artifact design (e.g. human factors/ergonomics, product usability, design and cognition, expertise and experience) in order to support and construct design applications. In particular, she has been a founder and Director of People and Systems Lab domain at QUT. The impacts of Vesna's research lies in the cross-fertilisation of knowledge across humanities and technologies to design humanised artifacts/ systems by facilitating the understanding of diverse expertise and experience. Vesna is a Fellow of the Design Research Society (UK) and Design Institute of Australia (DIA). She is the recipient of four Australia Research Council grants (v.popovic@qut.edu.au).

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Dr. Helen Thompson is a lecturer in Statistics in the School of Mathematical Sciences at Queensland University of Technology. After graduating from her BSc (Hons) in Mathematics from the University of Queensland in 2001, she worked as a statistics research officer for the Australian Bureau of Statistics in Canberra. In 2008 she was awarded her PhD in Statistics from the University of Glasgow, United Kingdom. During her PhD candidature, she was employed as a teaching assistant in the Department of Statistics at the University of Glasgow. Dr. Thompson has been chief investigator grants totalling over $1.5m. Her research interests include applied statistics, optimum experimental and sampling design, design of clinical trials, Bayesian design, copula modelling, econometric modelling, and spatial modelling and sampling. (helen.thompson@qut.edu.au)

Alethea Blackler

Alethea Blackler (PhD) is an Associate Professor and Head of Discipline in Industrial Design at Queensland University of Technology, Brisbane, Australia. Her principle area of research interest is intuitive interaction, in which she is one of the world leaders. She pioneered the first empirical work in the field, and has led a prestigious ARC Discovery project on Facilitating Intuitive Interaction for Older People. She recently edited a special issue of the OUP journal Interacting with Computers on Intuitive Interaction and is continuing work on developing design methodology for intuitive interaction as well as applying intuitive interaction into other areas, such as gaming, children, navigation and expertise. She has published extensively, been invited to give presentations internationally and is the recipient of several awards. She has regularly reviewed papers for international conferences and journals. Associate Professor Blackler is a member of the Design Research Society (DRS) (a.blackler@qut.edu.au).

Ben Kraal

Dr Ben Kraal is a Research Fellow with the People and Systems Lab at QUT. His PhD looked at the lived experience of people who use speech recognition software every day and at how speech recognition software could be made more useful for daily work. More recently Dr Kraal's work has focused on how people experience complex systems and services with a focus on airports and healthcare. He was a joint recipient of the 2011 Engineers of Australia Queensland award for R&D for a pilot study "Airports of the Future". Dr Kraal's work on airport passenger experience has been highly influential and achieved significant impact in the industry. In the healthcare domain Dr Kraal has focused on the experiences of patients, nurses and doctors and other stakeholders in several projects. Notable examples include identifying expertise in nurses applying compression bandages, performing user-testing for a prototype telehealth stethoscope and investigating eHealth system experiences of people with an intellectual disability. Dr Kraal's work is situated at the intersection of design and qualitative sociology and draws on both disciplines to reveal how systems and services are made useful (b.kraal@qut.edu.au).